

Lithium Propellant Purification and Filtration System For LFA and MPD Thrusters, Phase I

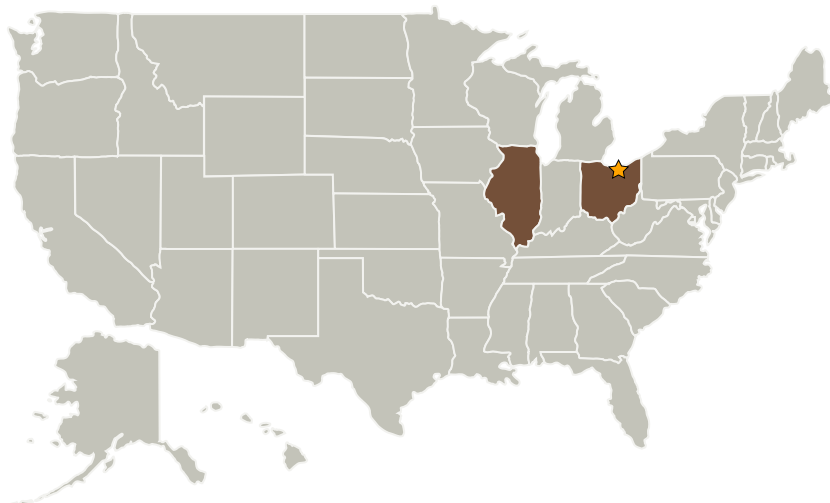
Completed Technology Project (2005 - 2005)



Project Introduction

Lithium has been proposed as an attractive metal propellant for advanced nuclear-electric propulsion missions in the outer solar system. While it is low molecular weight for high Isp and had high conductivity for MPD acceleration, it is also corrosive to most metals, leeches elements from alloys, destroys dielectric insulators and is heavily prone to contamination. Porous metal electrodes, valves and plumbing can become clogged by lithium oxide, nitride and carbide formation and deposits. Impurities in liquid lithium also enhance metal flaking and tankage erosion. The design of a lithium purification and filtration system using highly porous gettering materials, hot/cold trap filters, gas desorption, and liquid metal pumping is proposed in this Phase I research effort. The goal is to eliminate clogging and contamination effects for long-duration space missions >5 years where buildup can be a show-stopper. Exerimental testing and validation of material configurations will lead to a prototype lithium purification and fltration system in Phase II.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Starfire Industries LLC	Supporting Organization	Industry	Champaign, Illinois



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations

Illinois

Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Robert Stubbers

Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.1 Cryogenic Systems
 - └ TX14.1.1 In-space Propellant Storage & Utilization